



Royer Labs

Model SF-2

Active Ribbon® Velocity Microphone

Operation Instructions Manual & User Guide

Made in U.S.A.

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Introduction

Congratulations on your purchase of a Royer Labs model SF-2 active ribbon® microphone. The SF-2 is a handcrafted, precision instrument capable of delivering superior sound quality and exceptional performance. Combining sophisticated technological advancements with old-world craftsmanship, the SF-2 incorporates a proprietary head amplification system which delivers sensitivity comparable to that of modern condenser microphones. In addition, the electronic circuitry isolates the ribbon element from impedance mismatches, phantom power, and other conditions that can degrade microphone performance or damage the SF-2's sensitive ribbon element.

This operator's manual describes the SF-2, its function and method of use. It also describes the care and maintenance required to ensure proper operation and long service life. The users guide section of this manual offers practical information that is designed to maximize the performance capabilities of this microphone.

Royer Labs products are manufactured to the highest industrial standards using only the finest materials obtainable. Your SF-2 went through extensive quality control checks before leaving the factory. Normal care is all that is required to assure years of trouble-free service.

Please read this manual thoroughly in order to become familiar with the SF-2's capabilities. It will assist you in making the most of the microphone's superior acoustic properties. This owner's manual is a handy reference guide and we suggest you refer to it whenever questions arise on the use and care of your SF-2 ribbon microphone.

Active Ribbon® Technology

The SF-2 is distinguished by its cross-field ribbon transducer and its proprietary electronic system, consisting of a specially designed toroidal transformer and an electronic buffering stage. The extremely light mass, 1.8-micron ribbon element is 1.25" (32 mm) in length, <1/16" (1.6mm) wide, and housed in a classic two-polepiece, four-magnet ribbon transducer. This ribbon system is able to respond to the most minute tonal nuances and transients beautifully, with an extremely natural, uncolored output. The electronics system provides excellent frequency response, extremely low noise and distortion, and moderately high SPL handling (130 dB @ 50 Hz) without the use of a pad. It also gives the SF-2 an output level comparable to that of phantom powered condenser microphones, and its buffer stage provides a low impedance output and presents an optimum load to the ribbon element at all times. Non-powered ribbon microphones suffer substantially degraded frequency response and lowered gain when paired to preamps with too low an input impedance. With the SF-2's active electronic system, variations in the input impedance of the following preamp have virtually no effect on the microphone's frequency response and output.

Description

The Royer Labs SF-2 is a compact, bi-directional (figure-eight) velocity type ribbon microphone designed for professional applications. It is a modern ribbon design, with no audible diffraction effects or cavity resonance. The figure-eight pick-up pattern allows the SF-2 to be addressed from either side with equal sensitivity. The in-phase signal is achieved when the microphone is addressed from the front, indicated by the “ROYER” logo.

The SF-2 is reasonably tolerant to shock and vibration, but care should be taken to prevent rough handling, which could stretch the sensitive ribbon element (see the Care & Maintenance section of this manual). The performance of the microphone is unaffected by changes in temperature or humidity.

It is important to note that while Royer ribbon microphones are known for durability, they still must be treated with the respect due any fine instrument. All Royer’s are built to last a lifetime, but the thicker ribbon elements in our R-series ribbon microphones were designed to withstand closer miking and higher SPL’s than the finer ribbon elements used in the SF-2. The SF-2 is rated to handle 130 dB SPL at 50 Hz, while the R-121 can handle levels greater than 135 dB SPL at 40 Hz. Please keep this in mind as you use your SF-2. Handled carefully, it will be many years before you need to re-ribbon your microphone (ribbons can last indefinitely if not abused).

Ribbons in the Digital World

Digital recordings benefit greatly from the properties inherent in ribbon microphones. Since A/D converters cannot distinguish between the sound source being recorded and the complex distortion components often generated by condenser microphones, they can have difficulty tracking the signal, resulting in ringing and edgy-sounding tracks. With ribbon microphones, ringing is almost nonexistent due to the ribbon’s lack of distortion artifacts and high-frequency peaks. A/D converters have less difficulty tracking the ribbon-generated signal, resulting in smoother sounding digital recordings free of microphone-related edginess.

User’s Guide

Using the SF-2 Active Ribbon® Microphone

The head amplification system in the SF-2 was designed to operate with standard 48-volt simplex phantom power only. *The microphone will not work at all if phantom power is not applied to the microphone!* This aspect of an active ribbon microphone is in sharp contrast to conventional ribbon microphones. The ribbon elements in non-powered ribbon mics can be stretched or completely blown by phantom power. The ribbon elements in Royer’s active series ribbon microphones are electronically isolated and can not be damaged by phantom power.

1. To ensure long service life of your SF-2 active ribbon® microphone, care should be taken when connecting the microphone. We offer the following information as a general set of good habits that apply to both active ribbon mics and solid-state condenser microphones.
2. Although it is usually safe to “hot plug” most phantom-powered microphones to a preamplifier or console with the phantom activated, we suggest deactivating the phantom power prior to plugging the microphone in when possible. This minimizes any chance of random voltage surges entering the microphone. More importantly, it reduces the possibility of loud pops being transmitted to your monitors should the volume control be raised. Damage to your speakers could result from this oversight.
3. Be certain that the input channel fader or volume control is set to minimum before plugging in the microphone. Preamplifier gain trim should be set to minimum. Plug the microphone in and activate the phantom power switch. The microphone’s electronics will stabilize in a few seconds.
4. When the microphone becomes operational, bring the channel fader to 0-dB (unity) and use the gain-trim to set the desired level. This technique maximizes the signal-to-noise performance of the preamplifier or console input channel.
5. When disconnecting the microphone, bring the channel faders down and unplug the microphone cable ends. It is also advisable to turn off the phantom power before unplugging the microphone whenever possible.

Operation

1. The SF-2 is a side address, figure-8 (bi-directional) microphone and the rejection in the null points is very strong. The null points are the sides, top and bottom of the microphone. Engineers use the null points of figure-8 microphones to isolate instruments by positioning the mics in such a way that the null points face, and cancel, unwanted sounds.
2. In the horizontal plane, ribbon microphones do not discriminate against the “highs” off axis, nor do they boost them on axis. Therefore, several instruments or vocalists can be placed in front of the microphone without favoring the performer in the center of the group. Several performers can be grouped at both the front and back of the microphone, with one proviso. Since the outputs are out of phase at the front and back of the microphone, cancellation can result if two singers are placed at opposite sides, at equal distances and singing in unison, so listen to the feed before committing to it.
3. When using a ribbon microphone with loud signal sources, placing the microphone slightly off axis to the signal source will help protect the ribbon element.
4. The phantom powered SF-2 must be connected to a preamplifier or console capable of delivering 48-volts at a minimum of 4-milliamperes. Faulty or improperly wired cables could

cause the microphone to become inoperative. Since the active electronics isolate the ribbon element from phantom power, a miswired cable should not cause damage to the ribbon.

5. Never attempt to “test” the SF-2 or any ribbon microphone with an ohmmeter. A blown ribbon could result.
6. Always provide adequate wind protection by using a windscreen or mic sock with your SF-2 (and any other ribbon microphone).
7. If the microphone is to remain set up on a stand when not in use, place the provided mic sock over it until it is to be used. Do not carry the microphone around without placing a mic sock over it. Failure to follow this commonsense practice may yield a stretched ribbon and compromised performance.

Using the RSM-24 Shock Mount Accessory

Description

The SF-2 comes standard with an SFS-2 shock mount. This mount is operated by squeezing the clip side of the shock to widen its felt-lined interior, inserting the microphone, then releasing the clip to hold the mic securely.

The SF-2 with Deluxe packaging is supplied with a Royer RSM-24 suspension type shock mount. The RSM-24’s specially formulated polymer mounts provide maximum isolation from shock and vibration while holding the SF-2 securely in place, allowing the microphone to be safely positioned at any angle.

Carefully slide the SF-2 into the RSM-24, lining up the microphone’s logo with the RSM-24’s forward facing slot. The fit will feel tight, but the RSM-24’s Teflon interior will not scratch the microphone’s finish.

Amplification Considerations

Most quality microphone preamplifiers with nominal to high-gain characteristics and a built-in 48-volt phantom power source will give good results with your SF-2 active ribbon microphone. Unlike standard ribbon microphones, which depend on a proper impedance match to deliver optimal performance, the input impedance of your preamplifier will have minimal effect on the SF-2’s performance because the ribbon element is loaded perfectly via the microphone’s internal electronics. Careful consideration should be given to the quality of the microphone preamplifier. Studio grade preamplifiers usually sound much better than cheaper models. Headroom, noise floor, transparency and coloration are all factors to consider in determining which preamplifier is suitable for your studio or live applications. Other features are usually secondary and fall into the categories of convenience or interface capabilities (such as digital or optical outputs).

A good preamplifier should sound natural, with no sign of edginess or excessive noise. Vacuum tube preamplifiers sound warm, yet airy and transparent. Do not expect a vacuum tube preamplifier to be as quiet as a solid-state preamp, as electron emissions from tubes tend to convey more thermal noise than transistors. Tube preamplifier noise is far less of an issue with the SF-2 than with conventional ribbon microphones because the SF-2's high output allows for preamp gain to be set lower, reducing preamp generated noise. Transformer coupled designs tend to sound punchy and full bodied and offer the added benefit of true electronic isolation. This greatly enhances their ability to interface with other equipment with minimal noise or hum.

There are many excellent preamplifiers on the market today. Choose one that fits your budget and offers good performance, remembering that you get what you pay for. If you have the opportunity to audition one or more preamplifiers before you buy, do so. Microphones and preamplifiers work together as a team and some are better matches than others.

The SF-2 is capable of substantial output signal, especially when used for high SPL applications like drum overheads. It will not overload or produce distortion up to its SPL handling capacity of 130 dB SPL. In actuality, the SF-2's ribbon would stretch before its electronics would overload. Due to the high output potential of the SF-2 on loud sound sources, it is recommended that the pad on the microphone preamplifier be engaged to prevent the possibility of overloading the preamplifier's input stage electronics. Some preamplifiers are more thoughtfully designed than others, with a suitable pad that is placed before the preamp's active electronics. Other pre's may have a pad incorporated into a "feedback loop", which could still produce distortion due to overloading even when the pad is engaged. Although this is not often an issue, we felt it was important to cover the subject.

In conclusion, preamplifier coloration is optional and a matter of personal taste. Some people like and use the effect of coloration while others strive for absolute transparency.

Equalization and Ribbon Microphones

One of the great strengths of ribbon microphones is how well they respond to EQ. Even with substantial amounts of equalization, ribbons retain their natural sound quality. For example, if a lead vocal is being performed on a ribbon microphone and you want more highs, you can boost upper frequencies to the point where the ribbon mic emulates the performance curve of a condenser mic with excellent results. This is not to say that a ribbon microphone can always replace a quality condenser mic, but the EQ friendliness inherent in ribbon microphones does allow for an enormous amount of flexibility.

Ribbon mics take EQ well because of their inherent low self-noise and unusually smooth frequency response characteristics. Dialing in high amounts of equalization on condenser or dynamic microphones also means dialing in equivalent amounts of the microphone's distortion products and self noise; musically unrelated artifacts that contributes to an unnatural, unpleasant sound. Because distortion and self-noise are almost non-existent in ribbon microphones, high levels of EQ can be used without adding harshness or excessive noise.

Hum, Noise & Mic Orientation

All ribbon microphones are susceptible to picking up stray alternating magnetic fields, which show up in the audio signal as hum. Power transformers (such as those found in guitar amplifiers) and alternating current motors are the most likely sources of hum. In-wall wiring, solid-state light dimmers, and electrical utility transformers are other likely sources.

A well designed microphone provides shielding to minimize the effects of such stray magnetic radiation. Complete isolation is not possible however and unpowered ribbon microphones can manifest this condition to a greater degree because of their higher gain requirements. With vintage ribbon microphones that often employ large, bulky magnet structures and are often poorly shielded, the problem can be even worse.

The SF-2 reduces induced hum in three ways. Because the essential gain is provided at the microphone, there is no need to push the preamplifier for excessive (hum producing) gain. Royer SF microphones (SF-2, SF-12, SF-24 and SF-24V) are also designed to minimize the effects of stray radiation by integrating the transducer barrel as part of the magnetic return circuit, further reducing hum potential. Lastly, all SF-series ribbon microphones incorporate toroidal impedance matching transformers, which repel magnetic radiation.

Hum can only come from external sources and simply repositioning a ribbon microphone is the best way to control it. If hum is detected, the microphone is in the proximity of an alternating magnetic field.

While listening to the mic's output (preferably with headphones), move the mic around. It will "find" the noise source quite easily. For example, if you are miking a guitar amplifier and suspect the amplifier's power transformer to be the source of hum, move the mic around the amplifier. You will probably find that the hum is louder as you approach the amplifier's power supply and quieter when you move it away. Eliminating the hum can be fairly simple and requires using the "null" point of the microphone. The null point is the position that places the microphone's magnetic components away from the lines of the noise's radiation. Slightly rotating the microphone is usually all that is required to cancel out the hum. This is similar to the procedure guitarists use to eliminate hum from single-coil guitar pickups, turning around slowly while listening for the hum to cancel. There will be a position where the hum disappears from the mic's output. Hum and other noise can even be picked up by microphone cables. Since the output of Royer Active Series mics is 15 dB to 25 dB higher than with traditional ribbon microphones, any noise picked up in the mic cables will be at a corresponding lower level and thus less likely to be objectionable.

The Sweet Spot

Finding and Working with the Sweet Spot

The “sweet spot” is that perfect position where you put a microphone and the instrument you are recording snaps into focus. There are only general rules as to where the sweet spot may be found for any given microphone/instrument relationship, and usually experimentation reveals it.

The sweet spot can be extremely variable since it depends on the quirks of a given microphone and a given room. Once the sweet spot is discovered, this placement can become a rule-of-thumb starting point for future microphone placement with similar sound sources. Remember, if it sounds good, it’s probably right. If it doesn’t sound good, move the microphone. It’s often more effective to reposition the microphone than to start adjusting knobs. Knob twisting can affect headroom and phase coherence and add unwanted noise.

The following is a list of variables that contribute to “sweet spot” effect.

1. Frequency response variations due to proximity effect.
2. Frequency response variation due to treble losses as a result of absorption and narrowing of the pattern at high frequencies, causing weakening of highs as the microphone is moved away from the sound source.
3. Variation in ratio of direct to reverberant sound.
4. Tendency of a microphone to favor the nearest sound source due to a combination of the above items, plus the influence of inverse square law. Inverse square law states that for each halving of source-to-microphone distance, the sound pressure level quadruples.

Other Types of Microphones

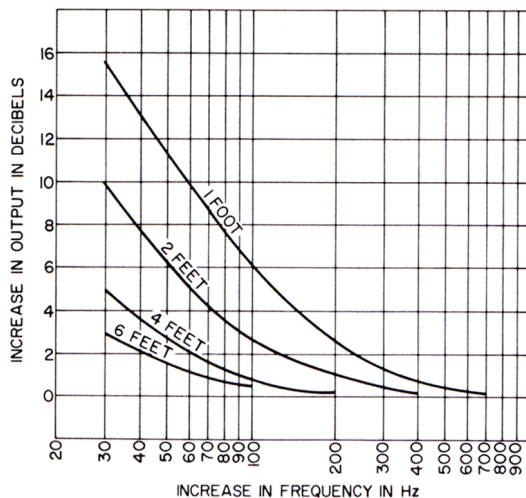
For the same ratio of direct to reverberant sound, omni-directional microphones must be closer to the sound source than cardioid or bi-directional microphones. Microphones should generally face the sound source head-on. Otherwise reduced treble due to phase loss effect will result. The exception here is for large condenser microphones, which often give the flattest response at an angle of about 10-20 degrees (off axis), where phase loss and diffraction effect offset each other somewhat.

Proximity Effect and Working Distance

The Sound That is “More Real than Real”

Ribbon microphones have long been renowned for a rich bass response. This effect is largely due to the fact that most ribbon microphones have excellent bass response, and at the same time exhibit substantial proximity effect (an increasing amount of bass response as the microphone is moved closer to the sound source)

As illustrated in the following graph, a typical bi-directional ribbon microphone will have a flat frequency response at a distance of about six feet from the microphone, but at shorter distances the bass response becomes boosted. The effect becomes increasingly pronounced as the distance between the microphone and the sound source is reduced.



Typical relationship of microphone distance to frequency response for ribbon-velocity bidirectional microphone.

This bass-boosting characteristic can become intense when close-miking and, if desired, can be corrected by equalization. However, for a multiple microphone setup, the pronounced proximity effect can be turned to an advantage. If an instrument such as a trumpet is close-miked and the bass is cut to restore flat response, other low-frequency sounds with potential for bleeding into the mic will be cut back by upwards of 20 dB compared to an unequalized microphone with a flat response.

Another area where proximity effect can be turned to an advantage is in making things sound “more real than real.” For example, many voices and certain musical instruments produce fundamental frequencies

within the bass range (below 150Hz or so) but the fundamentals are weak. In a worst case, if a microphone which has no proximity effect and a rising high frequency response is used on an upright piano, or on a person with a thin, weak voice, the recording is likely to sound even thinner than the original sound source. In contrast, using a microphone with strong proximity effect on such sound sources can result in a “better than real” sound, with the boosted bass response compensating for the weak fundamentals in the sound source. Since the fundamentals are present, but weak, boosting them by several dB will sound natural even though the sound has been sweetened. Radio and television announcers have long relied on proximity effect to give a full, rich, authoritative quality to their voices. By knowing how to work with proximity effect, engineers can get several useful effects without resorting to electronic manipulation.

Microphone Technique

General Tips for Using Ribbon Microphones

The SF-2 is highly versatile and well suited to a wide range of instruments, particularly those used in classical and scoring work where the SF-2's lack of microphone induced "hype" captures instruments in an extremely natural sounding way. Its smooth frequency response characteristics and ability to capture minute detail make it an excellent choice for strings, woodwinds, percussion and all acoustic instruments.. Phase-related distortion and irregular frequency peaks are conspicuously absent.

Strings sound very sweet and clean with ribbon microphones. Place the SF-2 anywhere from two to several feet from the instrument. For larger string sections, place the microphone(s) slightly above the instrumentalists and angled down; a distance of three or four feet will do the trick nicely.

Reed Instruments sound full and never edgy when captured with an SF-2. Normal working distances are about a foot or two from the instrument.

Brass Instruments and ribbon microphones go together very well. Mic the instrument from a distance of a couple of feet, and increase the working distance a little if several instruments are being used.

Pianos sound excellent with ribbon microphones and are free of phase-related comb filtering. The bass is full and rich while the top remains clean with no clatter. Mic the piano at a distance of one foot to several feet, depending on taste. A more direct upfront sound will be achieved when the microphone is placed closer to the soundboard.

For capturing a piano in stereo, place the SF-2's apart, one over the bass strings and the other over the high strings. The farther the mics are from each other, the wider the stereo spread. For a more direct stereo effect, the microphones may be placed in an X-Y pattern a couple of feet from the center of the soundboard. It is often worthwhile to remove the piano lid and suspend the microphone(s) above the soundboard for the most natural sound. When mics are placed inside a piano with a raised lid, the sound reflecting off the lid may be undesirable.

Amplified Instruments

Caution! The SF-2 is not recommended for close miking loud sound sources. Amplified instruments should be miked from a distance of 18 inches or more. The smooth, undistorted low-end response is very useful for electric guitars and electric bass. Since guitar amplifier speakers are often beamy, experiment with mic placement to find just the right spot. Placing the mic at greater distances from the speaker cabinet adds more room ambience to the mix. You will find that a ribbon microphone does not add undesirable elements to the sound. Basically, what you hear at the amp is what you'll get in the control room and in your recordings.

Choirs and Orchestras can be picked up very well with two SF-2's. Place the microphones at a distance of ten feet high, and a few feet behind the conductor. The microphones should be spaced apart approximately one foot and angled, one toward the left and one toward the right.

Drums and Percussion instruments sound very natural when recorded with SF-2's at a distance of two to several feet. For a drum set, placing the microphone(s) at a distance of three to five feet above the kit works very well. The SF-2 is not recommended for use as a kick drum mic or close miking individual drums, toms, etc.

Recording Loud or Plosive Sounds

Always remember that with ribbon microphones, wind is the enemy! Air movement is far more damaging to ribbon microphones than high SPL's. Some sound sources can generate powerful blasts of air that should be avoided. Kick drums, electric guitar and bass amplifiers should never be close miked with an SF-2. Royer R-series mics are more suitable for these purposes.

Stereophonic Microphone Technique

Classic Blumlein Technique

For many years, several “coincident” microphone setups have been widely used for picking up sounds in stereo as naturally as possible. The “Blumlein” technique, named for A.D. Blumlein of England, involves the use of two figure-eight microphones positioned as in the sketch (*see Figure 1*); so that one faces left and the other, right, at an angle of 90° (i.e. each displaced 45° from center).

Each microphone ultimately feeds one speaker in a stereo system, and due to the directionality of the microphones, the result is a very well defined stereo effect on playback. For classical music, particularly, the reproduction can be very satisfying.

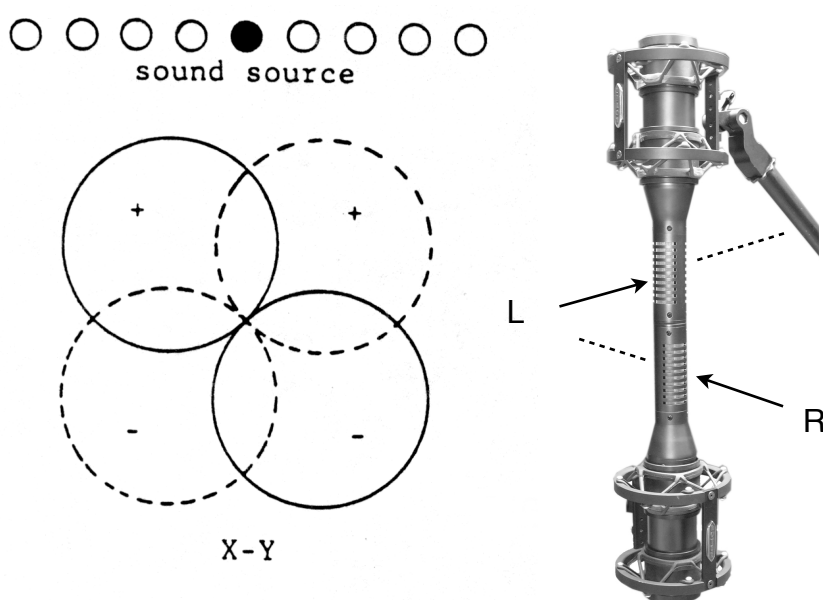


Figure 1
Classic Blumlein or “coincident” miking technique

Mid-Side Technique

In the early days of stereo radio broadcasting, there was need for a mic setup that would allow for simultaneous stereo and mono feeds from the same mic array. The result was what is now known as the mid-side microphone technique. One mic faces sideways, one faces forward as shown in Figure 2, and they are connected as shown in Figure 3. When the outputs of the pair of microphones are combined at the mixer, they will behave like a pair of microphones, one facing left and one right, provided that levels are adjusted so the microphone’s outputs are matched. The width of the stereo image can be widened or narrowed by varying the ratio of the side mic to mid mic: turning down the side mic all the way will give a mono pickup.

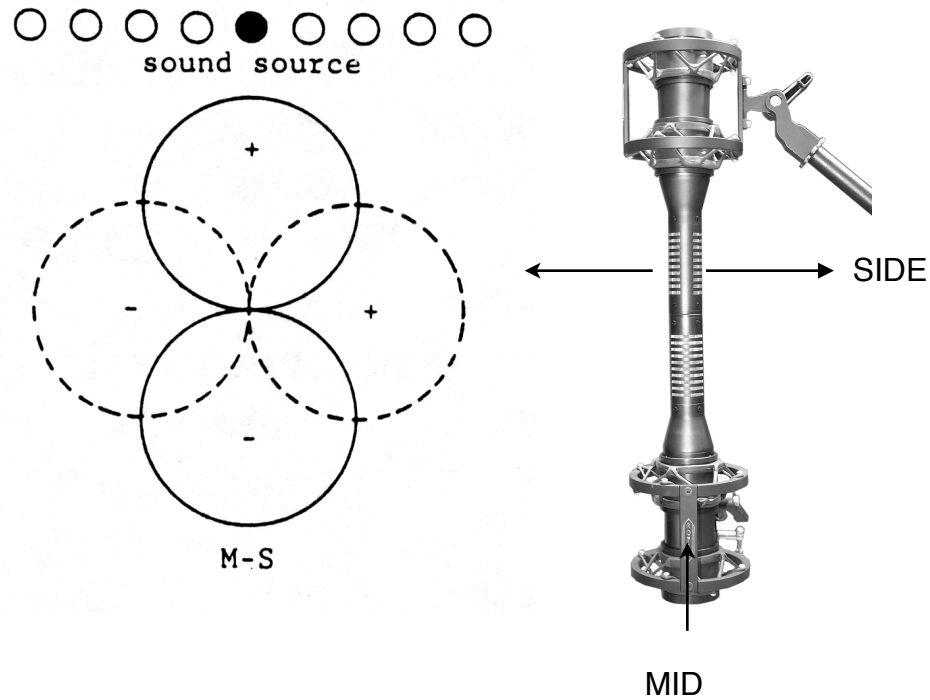


Figure 2
Typical M-S miking technique

If the outputs of the mid and side microphones are recorded on separate tracks, the electrical connections shown in Figure 3 can be made at the mixer outputs and the adjustment of the stereo separation can be done during mixdown rather than during the actual recording. This is very useful for live recording.

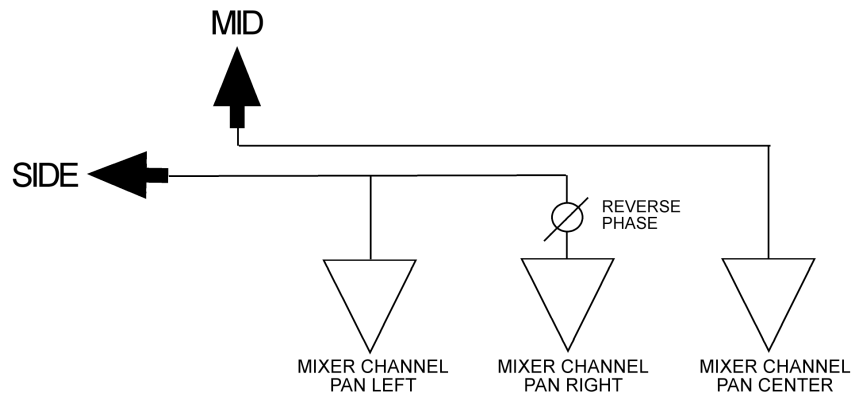


Figure 3
Typical M-S connection set-up

Care and Maintenance

1. The SF-2 is a solidly built, precision instrument. Keep the following commonsense rules in mind when using and/or storing it and it will last a lifetime.
2. Do not expose the microphone to severe shock or vibration, which could stretch the ribbon element. If the microphone is accidentally dropped, test it to see if it was damaged before returning it to service. Low output or a dull sound would indicate a stretched ribbon.
3. Do not expose the microphone to direct blasts of air or strong air currents. Use a windscreen or suitable blast filter when close miking vocalists or certain types of wind instruments. Popping does not necessarily damage the ribbon element, but it may produce unacceptable preamplifier overload or cause damage to speaker systems.
4. Do not expose the microphone to liquids or caustic smoke.
5. Use a soft cloth to clean the microphone body. A small amount of denatured alcohol can be used to remove fingerprints and other stains.
6. Keep metal filings away from the microphone at all times. The SF-2's powerful magnets can attract minute ferrous particles into the ribbon transducer. If these particles reach the ribbon element, the microphone will generate a scraping sound and a re-ribbon will be required.
7. When not in use, store the microphone in its protective wooden case. If the microphone is to remain set up on a mic stand between sessions, cover it with its mic sock (provided with your SF-2). Due to Royer's patented direct-corrugation method, the microphone can be stored horizontally without damaging the ribbon element.
8. Leave disassembly of the microphone to a trained technician. There are no user-serviceable parts inside.

Caution!

Keep recorded tapes, spring-wound watches and personal credit cards using magnetic coding away from the microphone to prevent possible damage to these items by the transducer's strong magnets.

Care for the Optical Black Finish

The SF-2's optical black finish is a sophisticated surface treatment designed to refract light rather than reflect it. This makes the microphone appear less conspicuous, especially when used with high intensity lighting or within a camera shoot. The finish requires occasional maintenance to retain a smooth, even appearance and to maintain its unique optical qualities.

The SF-2's body is comprised of a low-carbon steel alloy. Its finish consists of black chrome deposited over a nickel substrate, creating a finish that minimizes the reflective nature of the metal surface. A small amount of oil has been worked into the finish at the factory to protect it.

Over time, some of this oil will be drawn out due to "wicking" action, the physical handling of the microphone or absorbent materials it is exposed to (like the foam padding of the microphone case). As the oils are drawn out of the microscopic surface layer, the microphone finish may develop an uneven appearance. If this happens, simply massage the microphone gently with a lint free cloth treated with a few drops of light machine oil or WD-40® (apply the oil to the cloth, not to the microphone). Be very careful whenever working around the transducers to avoid contamination of the ribbon elements. Following this simple procedure will protect the finish and renew it to its original luster.

Features and Specifications

SF-2 Features:

- Smooth, wide frequency response
- Active electronics offer greatly enhanced output and deliver a constant, optimized impedance to the ribbon element
- Extremely low residual noise
- Ribbon element is unaffected by heat or humidity
- Absence of high-frequency phase distortion
- Excellent phase linearity, even off-axis
- Equal sensitivity from front or back of microphone
- Consistent frequency response regardless of distance
- Compact size

SF-2 Specifications:

Acoustic Operating Principle: Electro-dynamic pressure gradient

Generating Element: 1.8 micron aluminum ribbon

Polar Pattern: Figure-8

Frequency Range: 30 HZ – 15,000 HZ +/- 2db

Sensitivity: -38 dBv (Ref 1 Volt per Pascal)

Output Impedance: 300 Ohms @ 1kKz

Rated Load Impedance: > 1500 Ohms

Maximum SPL: > 130 dB SPL

Output Connector: Male XLR 3 pin (Pin 2 Hot)

Power Requirements: 48-Volt Phantom

Supply Current: 4 mA

High grade neodymium magnet assembly

Stainless steel internal baffle and dampener

Weight: 448 grams (15.8 oz.)

Dimensions: 142 mm x 39mm (base) x 25mm (top)

Finish: Matte Black

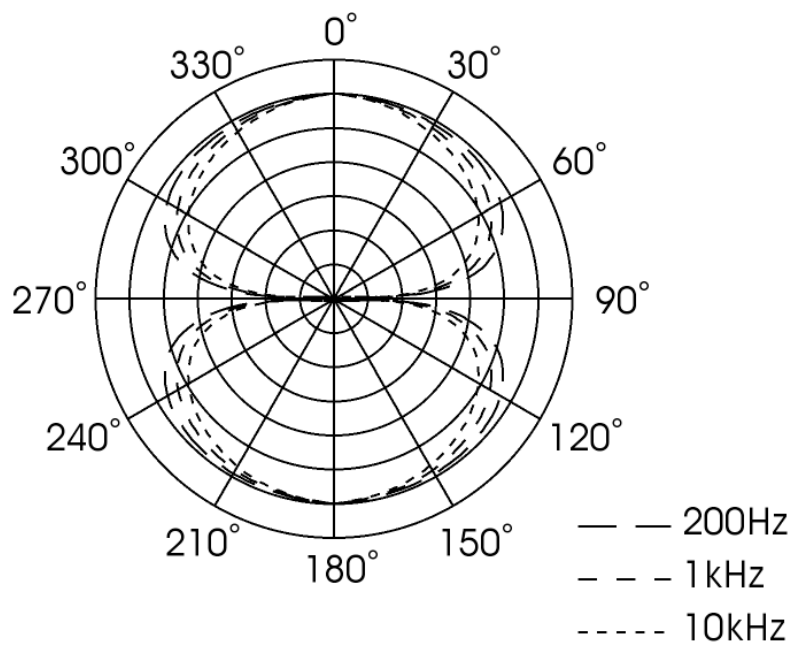
Accessories: Protective presentation case, mic sock,

Shock-mount, documentation. Deluxe packaging is available.

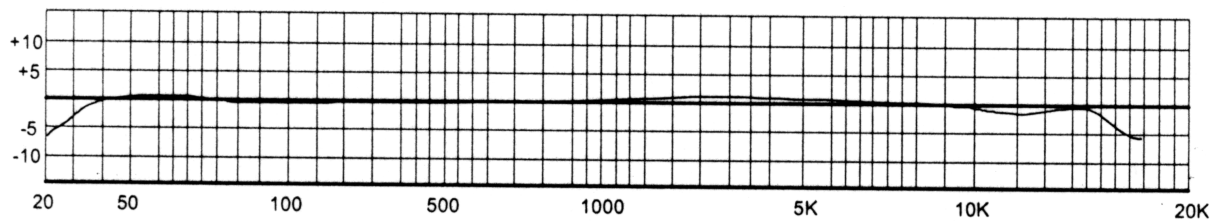
Microphone Warranty: Lifetime to original owner (repair or replace at Royer's option). Ribbon element not included in the lifetime warranty

Ribbon Element Warranty: One Year

Polar Pattern



Frequency Response



Warranty

PLEASE RETAIN YOUR ORIGINAL BILL OF SALE AS YOU WILL NEED TO PRESENT IT SHOULD YOU REQUIRE SERVICE UNDER THIS WARRANTY.

TO VALIDATE THIS WARRANTY, THE REGISTRATION CARD AND A PHOTOCOPY OF THE SALES RECEIPT FROM AN AUTHORIZED ROYER DEALER MUST BE ON FILE WITH ROYER LABS.

Royer Labs hereby warrants all Royer SF-series microphones with the following terms and conditions.

WARRANTY PERIOD

Body fit and finish	Lifetime
Transducer frames/magnets	Lifetime
Transformers	Lifetime
Vacuum Tube	10 years Parts and Labor
Cables & Cable Sets	2 years Parts and Labor
Shock Mount Accessories	2 years Parts and Labor
Ribbon Element	1 year Parts and Labor

SCOPE OF WARRANTY:

From the date of original purchase and for the respective periods specified above, Royer Labs agrees to repair, at its sole expense, all Royer Labs products which are defective in material and workmanship.

EXCLUSIONS:

This warranty does not cover the following:

1. Defects or damage caused by accident, fire, flood, lightning or other acts of nature.
2. Defects or damage caused by abuse, misuse, negligence or failure to observe the instructions contained in the owner's manual furnished at the time of original purchase.
3. Damage caused during shipping or handling.
4. Products that have had their serial numbers altered or removed.
5. Products purchased in "AS-IS" (used) condition.
6. Products that have been altered or repaired by anyone other than a factory authorized service station.

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